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**From:** Lee, Bessie [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=CD1A2CF2F38F4D0DA561C44C58223465-BELEE]  
**Sent:** 5/17/2016 2:15:41 PM  
**To:** Ivan FMCV [isfmcv@hopitelecom.net]; Macler, Bruce [Macler.Bruce@epa.gov]  
**CC:** lpuhuyesva@hopi.nsn.us; Daryl Melvin (daryl.melvin@ihs.gov) [daryl.melvin@ihs.gov]; Robert Lorenz [robert.lorenz@ihs.gov]; Jesse DeCoteau [jesse.decoteau@ihs.gov]; Brad Rea [brad.rea@ihs.gov]; Li, Corine [Li.Corine@epa.gov]; Albright, David [Albright.David@epa.gov]  
**Subject:** RE: Arsenic Information - Polacca Water System  
**Attachments:** 2016 05 16-Individual Contaminant Report-090400106-1 1 1970 4 30 2016.pdf

Ivan,

I would suggest that you work with Bruce Macler and Lionel Puhuyesva and perhaps IHS on what you want. I have copied Daryl Melvin, Robert Lorenz, Jesse DeCoteau, and Brae Rea of IHS on this e-mail in case you want to coordinate with them also.

Just an FYI. About 5 or 6 years ago, Bruce Macler was at Hopi and made 3 or 4 presentations in different locations within the First and Second Mesa areas about the health effects of Arsenic. One of the presentations was to the medical staff at the Hopi Health Care Center. At that time, Bruce had also used the historic Arsenic levels for the Polacca, Sipaulovi, Mishongnovi, and Shungopavi water systems and provided the villages with information that reflected the Arsenic levels in their respective water systems. I am sure that Bruce would like to travel back to Hopi to make similar presentations, but because of very limited travel funds, we will need to be creative. For instance, perhaps Bruce hold a Webinar for Hopi Health Care staff that usually conducts outreach to the villages. Then the Health Care staff can make the presentations about Arsenic (using Bruce's slides) to the villages. This is something, though, that would need to be coordinated with Daryl Melvin, the CEO of the Hopi Health Care Center. Again, we will need to be creative with limited USEPA travel funds.

One reminder. Please make sure that you continue with the quarterly monitoring for Arsenic at the Polacca water system. Bruce Macler used the historic Arsenic data (which is attached) in order to provide information about the Arsenic levels in the Polacca water system. Bruce's information is only as good as the data available. As we have discussed in the past, the collection of the quarterly Arsenic samples has not been consistent. There have been large data gaps. I will end my reminder.

Please contact me if you have any more questions.

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Bessie Lee

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Drinking Water Management Section (WTR-3-1)  
U.S. Environmental Protection Agency, Region 9  
75 Hawthorne Street  
San Francisco, California 94105  
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E-mail: lee.bessie@epa.gov

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**From:** Ivan FMCV [mailto:isfmcv@hopitelecom.net]  
**Sent:** Tuesday, May 17, 2016 6:43 AM  
**To:** Macler, Bruce <Macler.Bruce@epa.gov>  
**Cc:** Lee, Bessie <Lee.Bessie@epa.gov>; lpuhuyesva@hopi.nsn.us  
**Subject:** Re: Arsenic Information

Bessie. Thank you very much for referring me to the person who already responded. I would need written material and possibility of a CD for presentation on a TV screen in our lobby on daily basis. It

would be most helpful if a power point could be prepared for our use. It would be most help to present to schools, organizations, church groups and especially our Tribal Council. Our presentation could have information as it relates or reflects our levels of arsenic in our wells. I would be very interested in paying for printing of pamphlets to have available or distribution to the water users. Contact me so we can continue on this important and over due project by our office.

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**From:** "Macler, Bruce" <Macler.Bruce@epa.gov>  
**To:** "Lee, Bessie" <Lee.Bessie@epa.gov>, "FIRST MESA VLGS" <isfmcv@hopitelecom.net>  
**Cc:** "Lionel Puhuyesva (LPuhuyesva@hopi.nsn.us)" <lpuhuyesva@hopi.nsn.us>  
**Sent:** Monday, May 16, 2016 9:20:34 AM  
**Subject:** RE: Arsenic Information

Hi Ivan,

Bessie Lee passed along your email and also gave me the arsenic monitoring data for your wells. I'll try to address your concerns in two parts: what arsenic does to people, and what you can expect from drinking water with arsenic at the levels found in those wells.

With respect to arsenic, if you consume enough of it, it is definitely a poison and has several adverse physiological effects. At high enough doses (about 100-200 milligrams (mg, 1/1000<sup>th</sup> of a gram)), it stops mitochondrial respiration, your cells can't generate energy, and they (and you) die. This is what is meant by acute toxicity. In addition, arsenic can cause oxidative damage and stimulates the formation of a variety of physiological stress-related proteins. At lower levels, if ingested chronically over a longer time (1-10 mg per day or so for months or years), this still goes on, but not enough to kill you outright. However, your system may be weakened to the point that it isn't as effective at fighting off other kinds of cellular damage, which can build up and lead to other problems. Adverse health effects may then occur after years of exposure to these lower levels. Some of these include circulatory, neurological and liver problems. For example, a variety of skin diseases (hyperkeratoses, blackfoot, hyperpigmentation) are known to occur at levels starting around 0.1-0.2 mg per day. Arsenic also has hormonal effects that can cause diseases such as diabetes. These appear to happen even at much lower levels, perhaps less than 0.1 mg per day.

Arsenic is also a known human carcinogen. It appears to cause broken and missing chromosomes and other chromosomal abnormalities. It is known to cause lung, bladder, and skin cancers, and may cause liver, kidney and prostate cancers. Elevated cancer levels are seen in groups of people drinking water with arsenic levels of 0.1-0.2 mg per liter, which is about 0.2-0.4 mg per day depending on how much water you drink. It usually takes many years of drinking water at these levels for cancers to occur. At higher levels (0.5-1.0 mg per day), these cancers can form faster.

Fortunately, you weren't getting that much arsenic in your drinking water. The reported levels of arsenic in the drinking water were mostly from non-detect to around 0.01-0.02 mg per liter, slightly above our Maximum Contaminant Level of 0.010 mg per liter. If you consume 2 liters of water a day by drinking it or from eating food cooked in this water, you would get about 0.020-0.025 mg per day of arsenic. While the MCL violations certainly need to be addressed, it may be a bit of a comfort that medical studies don't show any disease being caused by arsenic at these levels.

I hope that this addressed your concerns. If you would like me to help you write or review any public communications, happy to do so. If you have more questions, you can reach me at the above email address, or at 415 972-3569

Bruce

Bruce A. Macler, PhD

Water Division Toxicologist

USEPA Region 9

75 Hawthorne St, WTR-3-1

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415 972-3569

Solutions, not complaints...

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**From:** Lee, Bessie  
**Sent:** Monday, May 16, 2016 8:17 AM  
**To:** Ivan Sydney <[isfmcv@hopitelecom.net](mailto:isfmcv@hopitelecom.net)>  
**Cc:** Macler, Bruce <[Macler.Bruce@epa.gov](mailto:Macler.Bruce@epa.gov)>; [lpuhuyesva@hopi.nsn.us](mailto:lpuhuyesva@hopi.nsn.us)  
**Subject:** Arsenic Information

Ivan,

First, hope you are doing well.

I am forwarding your e-mail below to Bruce Macler, who is a Toxicologist in our office. Bruce can provide you with the public health information about Arsenic. I have also included the historic Arsenic data for the Polacca water system in this e-mail. This will provide some background information for Bruce.

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Bessie Lee

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Drinking Water Management Section (WTR-3-1)

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**From:** Ivan FMCV [<mailto:isfmcv@hopitelecom.net>]

**Sent:** Monday, May 16, 2016 8:10 AM

**To:** Lee, Bessie <[Lee.Bessie@epa.gov](mailto:Lee.Bessie@epa.gov)>

**Subject:** Re: Eastern AZ NAWMA Gathering

Do you have recent publications on arsenic as it relates to the dangers? Does your agency have any records of how many deaths are related to arsenic. We will use the material for public presentations. It would be helpful if you have any pamphlets to give our to the public. We could download and print ourselves. Bernie is back to leading a public outcry on our water program. It is the Hopi Tribe who is delaying the water to our village. We are merely waiting on the promise by the tribe.